

# Inside the Mammogram: Pathology & Staging

Presented

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by

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# Inside the Mammogram: Pathology& Staging

## Objectives:

Anatomy ----- the basics

Pathology -----under the microscope

TNM System ---- understanding terms

Staging -----progression of disease

Treatment & Survival Rates ----- hope for the future

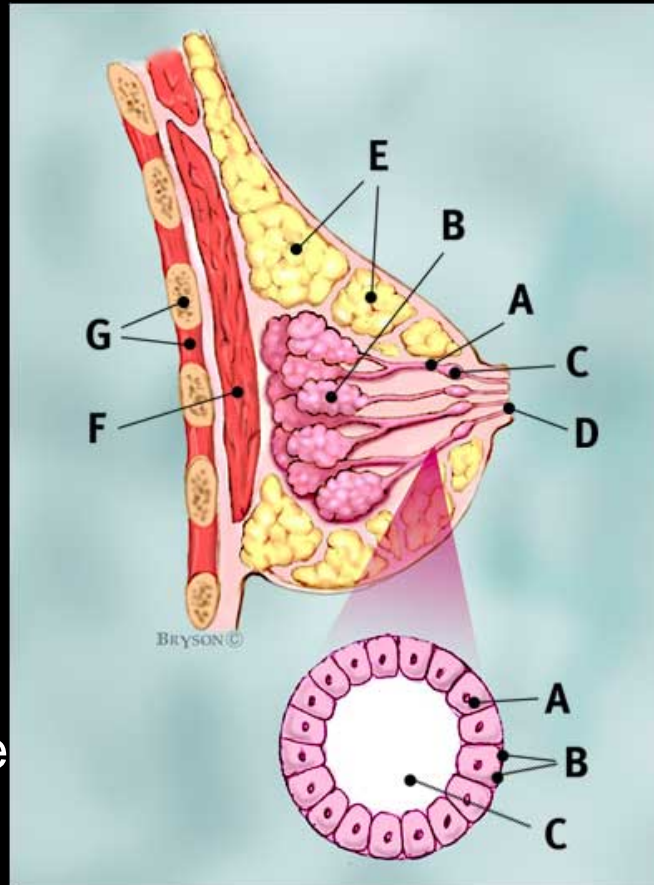
Questions ----- ???



# Inside the Mammogram: Pathology & Staging

## Anatomy

- A** ducts
- B** lobules
- C** dilated section of duct to hold milk
- D** nipple
- E** fat
- F** pectoralis major muscle
- G** chest wall/rib cage

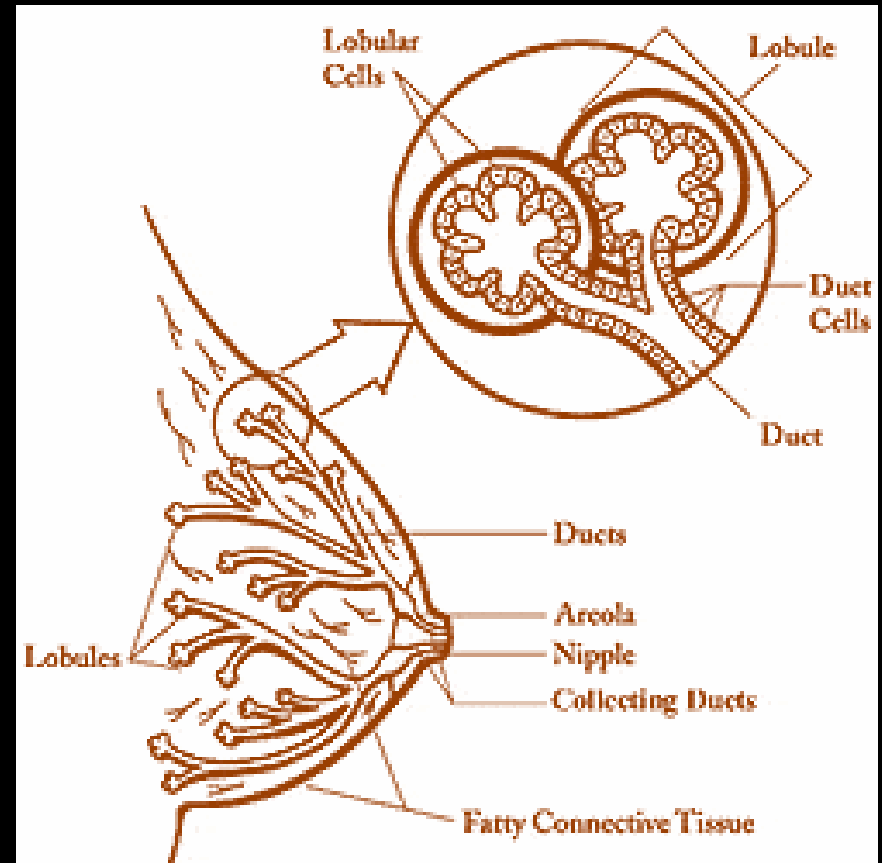
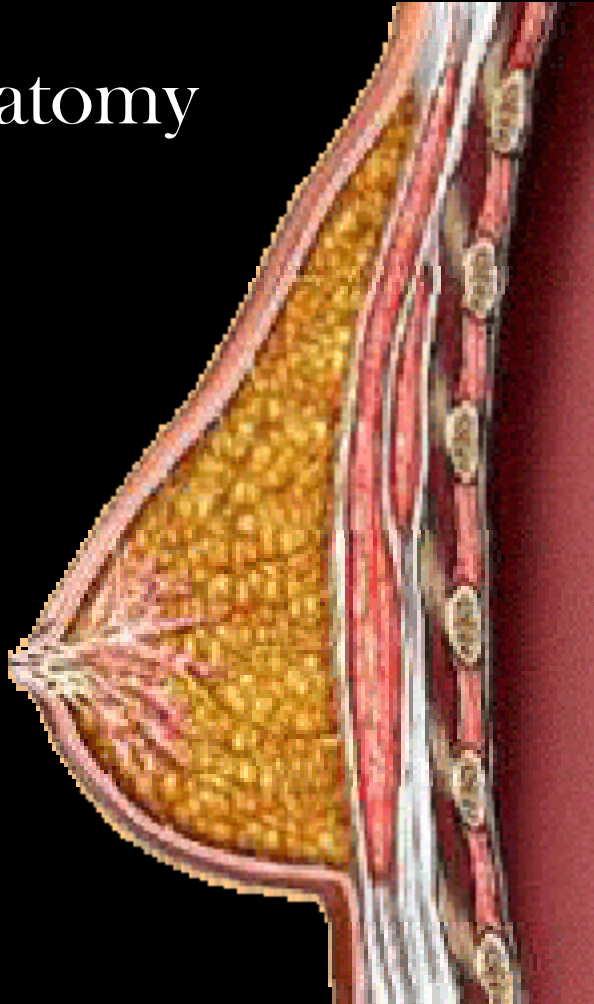


### Enlargement:

- A** normal duct cells
- B** basement membrane
- C** lumen (center of duct)

# Inside the Mammogram: Pathology & Staging

## Anatomy

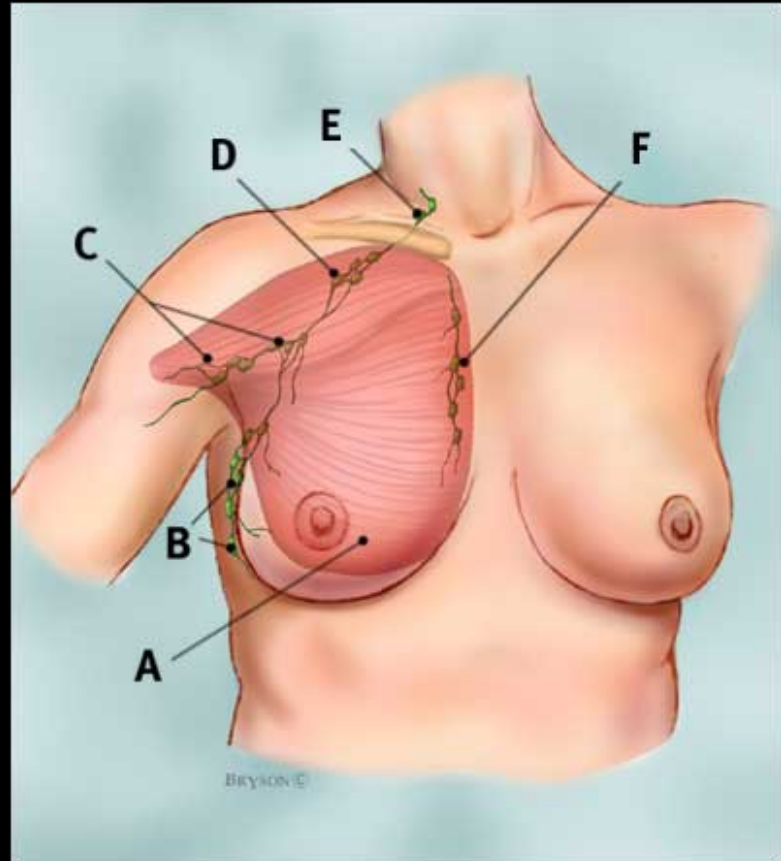


# Inside the Mammogram: Pathology & Staging

## Anatomy

## Axillary Lymph Nodes

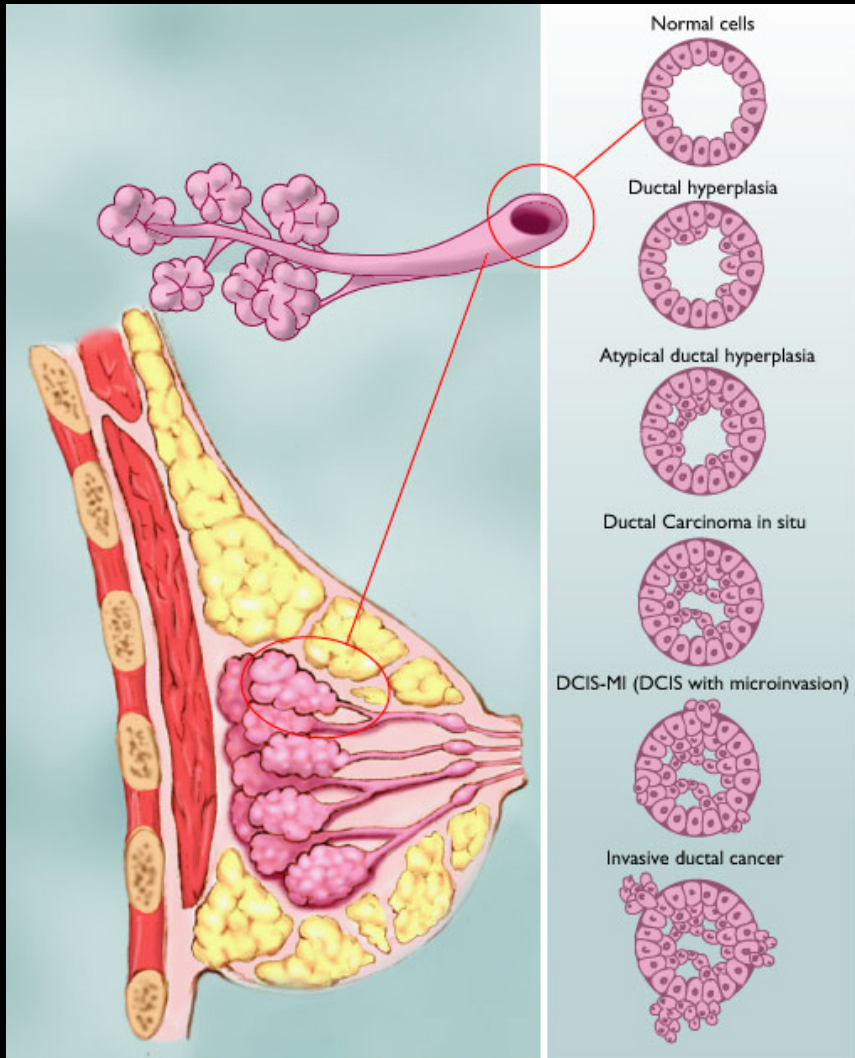
- **A** pectoralis major muscle
- **B** axillary lymph nodes: levels I
- **C** axillary lymph nodes: levels II
- **D** axillary lymph nodes: levels III
- **E** supraclavicular lymph nodes
- **F** internal mammary lymph nodes



# Inside the Mammogram: Pathology & Staging

## Pathology

## Progression of Ductal Carcinoma



Normal Cells

Ductal Hyperplasia

Atypical Ductal Hyperplasia

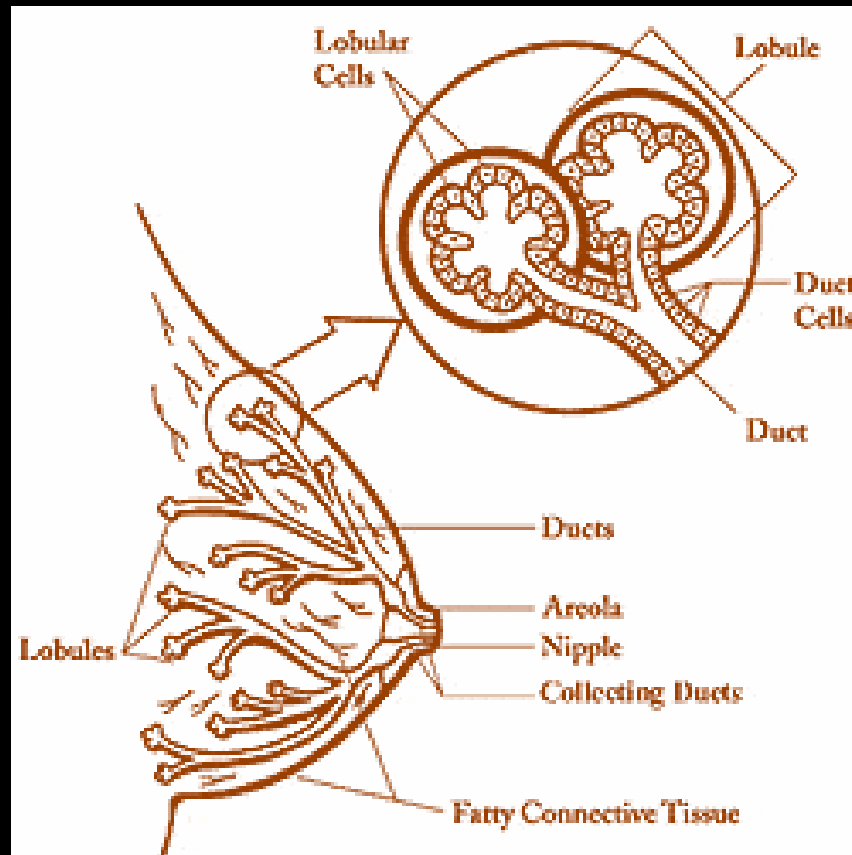
Ductal Carcinoma *in situ*

DCIS – M1 ( DCIS with micro invasion)

Invasive Ductal Carcinoma

# Inside the Mammogram: Pathology & Staging

## Pathology



# Inside the Mammogram: Pathology & Staging

## Pathology

## Ductal Carcinoma *in situ*

**A** ducts

**B** lobules

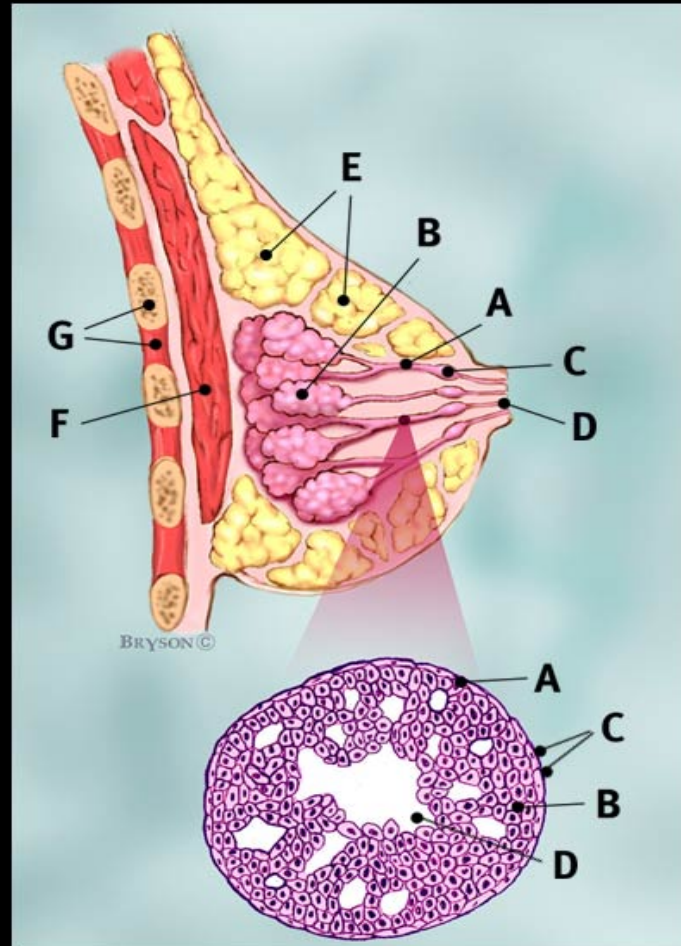
**C** dilated section of duct  
to hold milk

**D** nipple

**E** fat

**F** pectoralis major muscle

**G** chest wall/rib cage



### Enlargement:

**A** normal duct cells

**B** ductal cancer cells

**C** basement membrane

**D** lumen (center of duct)



# Inside the Mammogram: Pathology & Staging

Mammogram

Ductal Carcinoma *in situ*



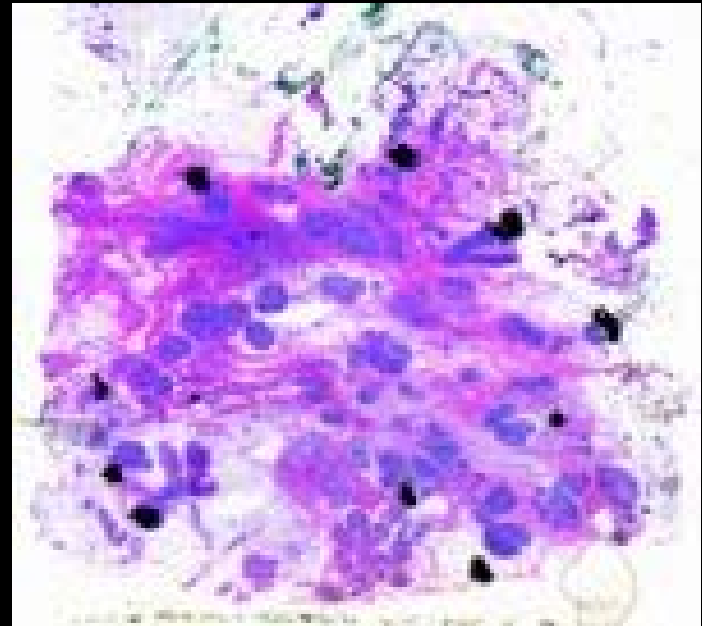
# Inside the Mammogram: Pathology & Staging

## Ductal Carcinoma *in situ*

Pathology



Under the Microscope



# Inside the Mammogram: Pathology & Staging

## Pathology

## Invasive Ductal Carcinoma

**A** ducts

**B** lobules

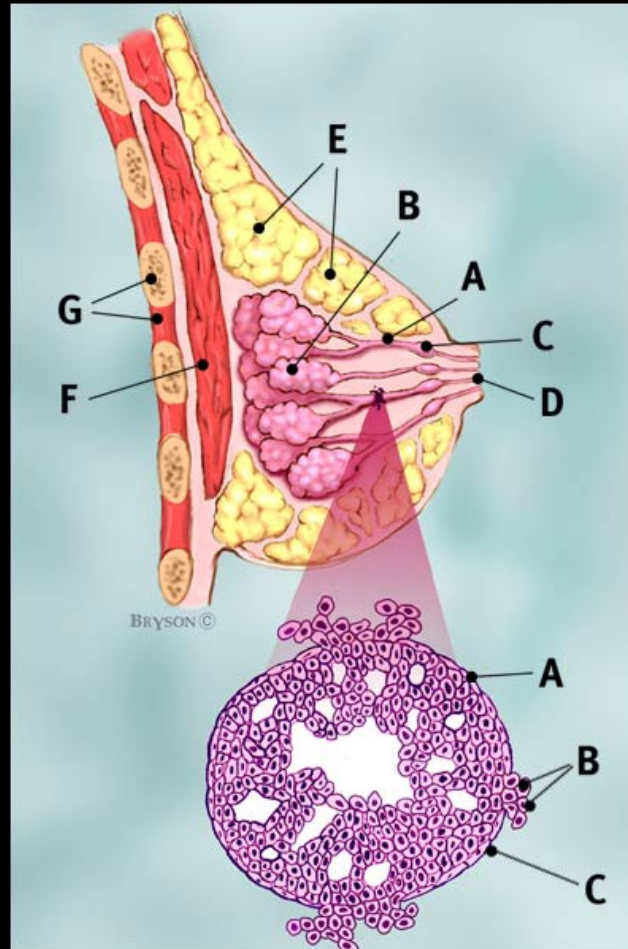
**C** dilated section of duct to hold milk to hold milk

**D** nipple

**E** fat

**F** pectoralis major muscle

**G** chest wall/rib cage



### Enlargement:

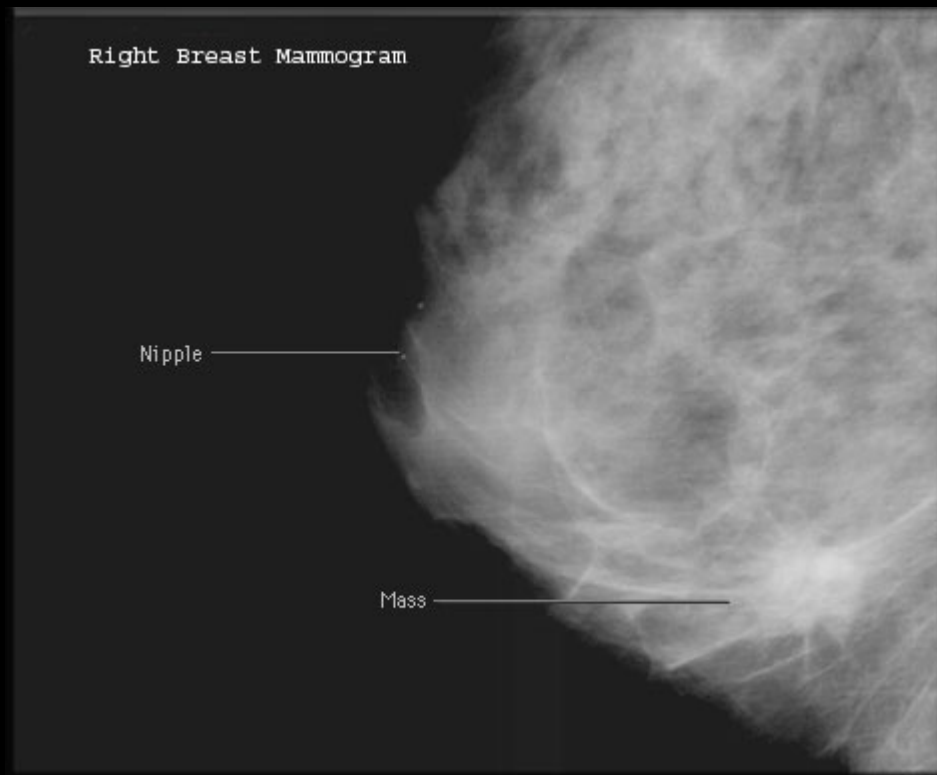
**A** normal duct cells

**B** ductal cancer cells breaking through the basement membrane

**C** basement membrane

# Inside the Mammogram: Pathology & Staging

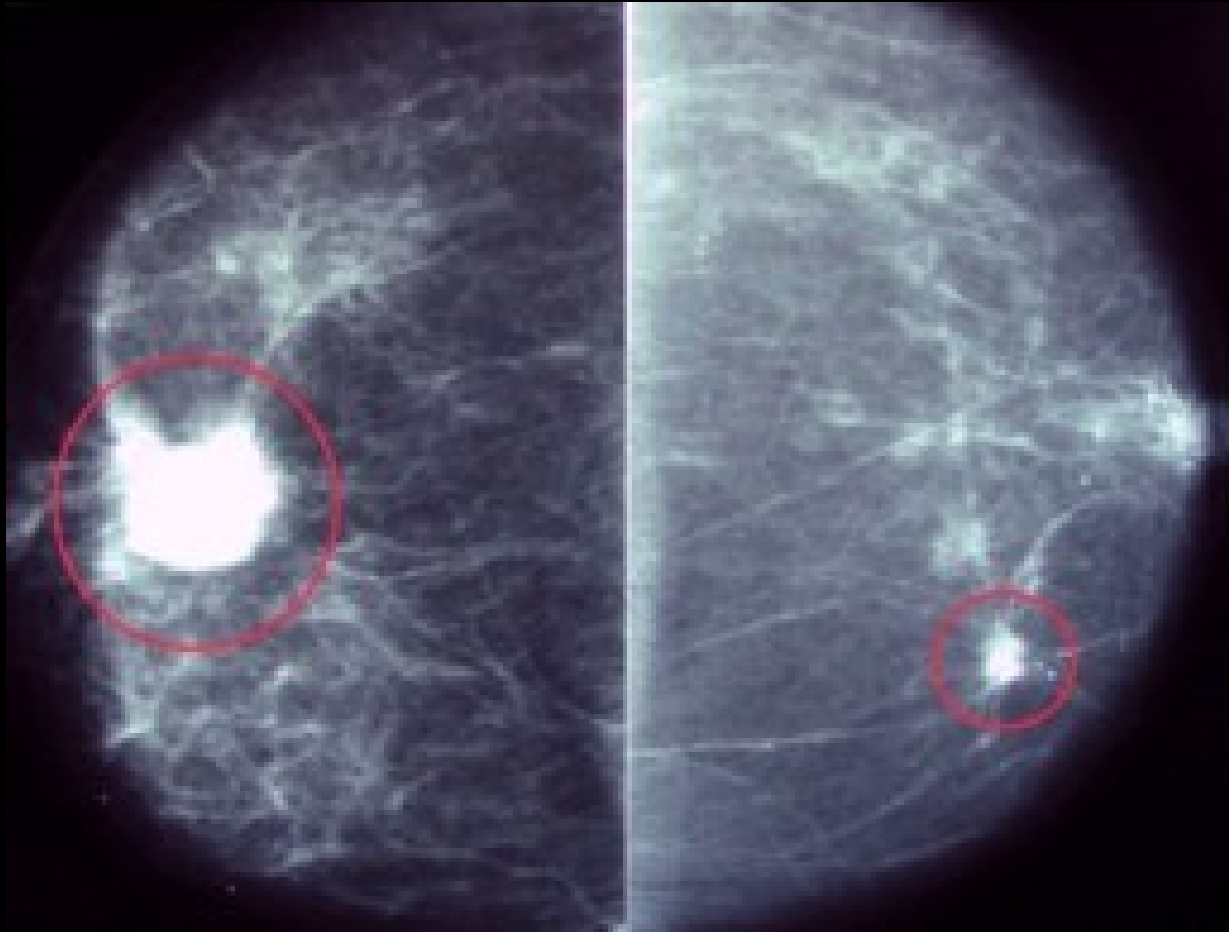
## Mammogram      Invasive Ductal Carcinoma



# Inside the Mammogram: Pathology & Staging

Mammogram

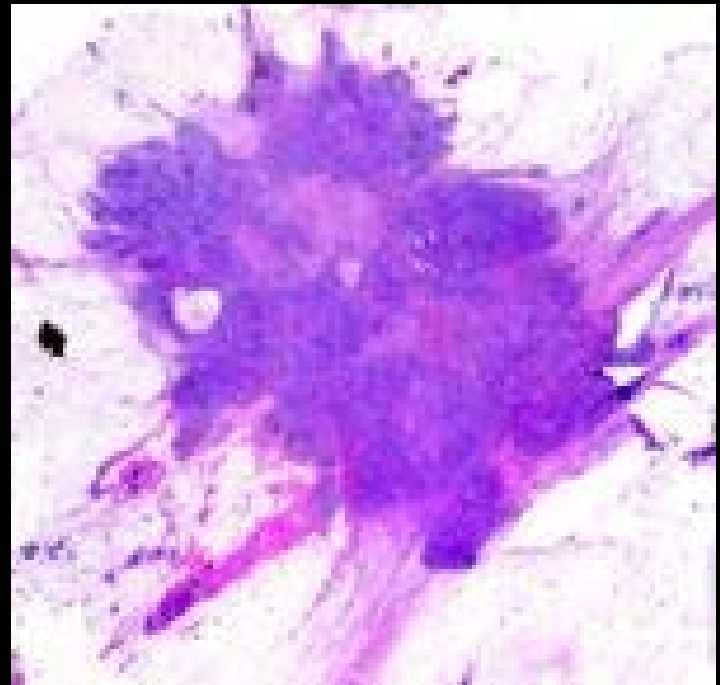
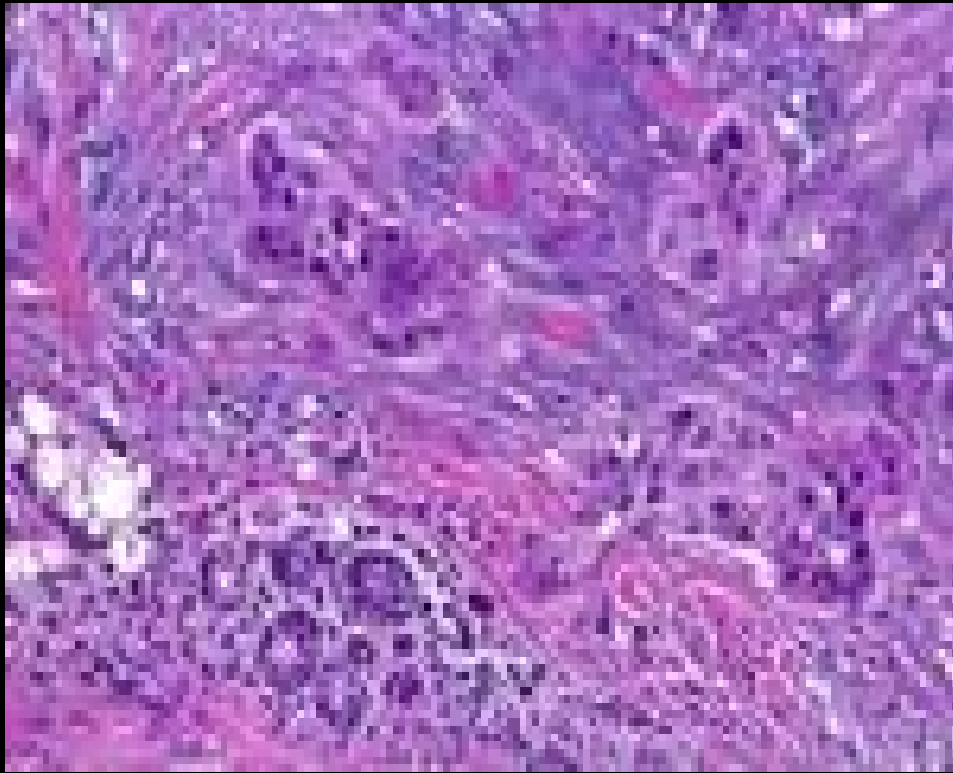
Invasive Ductal Carcinoma



# Inside the Mammogram: Pathology& Staging

## Invasive Ductal Carcinoma

### Pathology Under the Microscope



# Inside the Mammogram: Pathology & Staging

## Pathology

## Lobular Carcinoma *in situ*

**A** ducts

**B** lobules

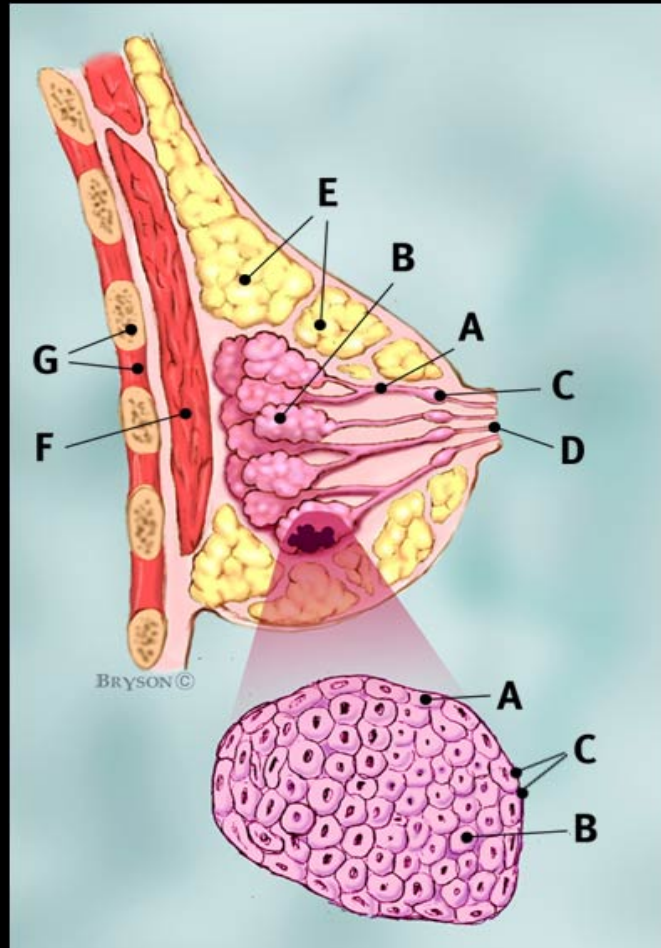
**C** dilated section of duct  
to hold milk

**D** nipple

**E** fat

**F** pectoralis major muscle

**G** chest wall/rib cage



### Enlargement:

**A** normal lobular cells

**B** lobular cancer cells

**C** basement membrane

# Inside the Mammogram: Pathology& Staging

Mammogram

Lobular Carcinoma *in situ*



# Inside the Mammogram: Pathology& Staging

## Lobular Carcinoma *in situ*

Pathology

Under the Microscope



# Inside the Mammogram: Pathology& Staging

## Pathology

## Invasive Lobular Carcinoma

**A** ducts

**B** lobules

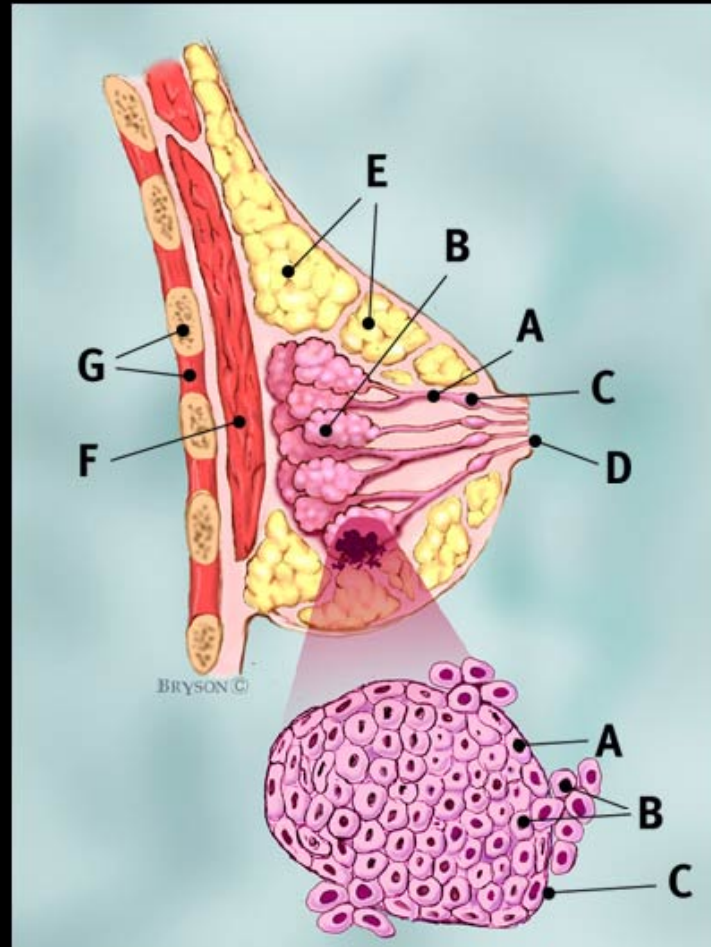
**C** dilated section of duct  
to hold milk

**D** nipple

**E** fat

**F** pectoralis major muscle

**G** chest wall/rib cage



### Enlargement:

**A** normal cells

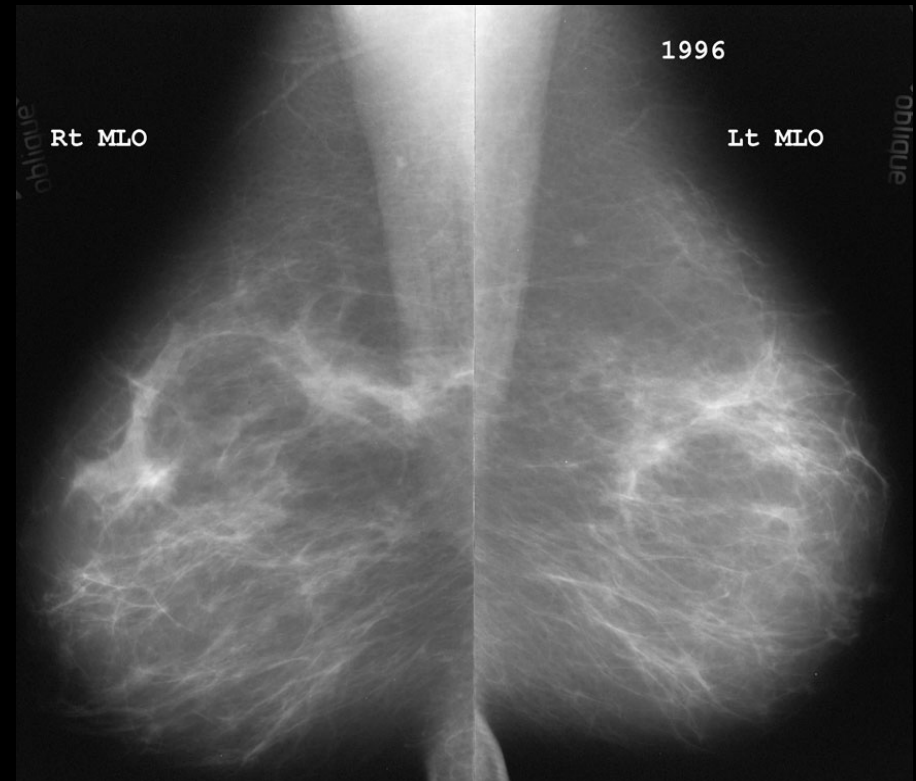
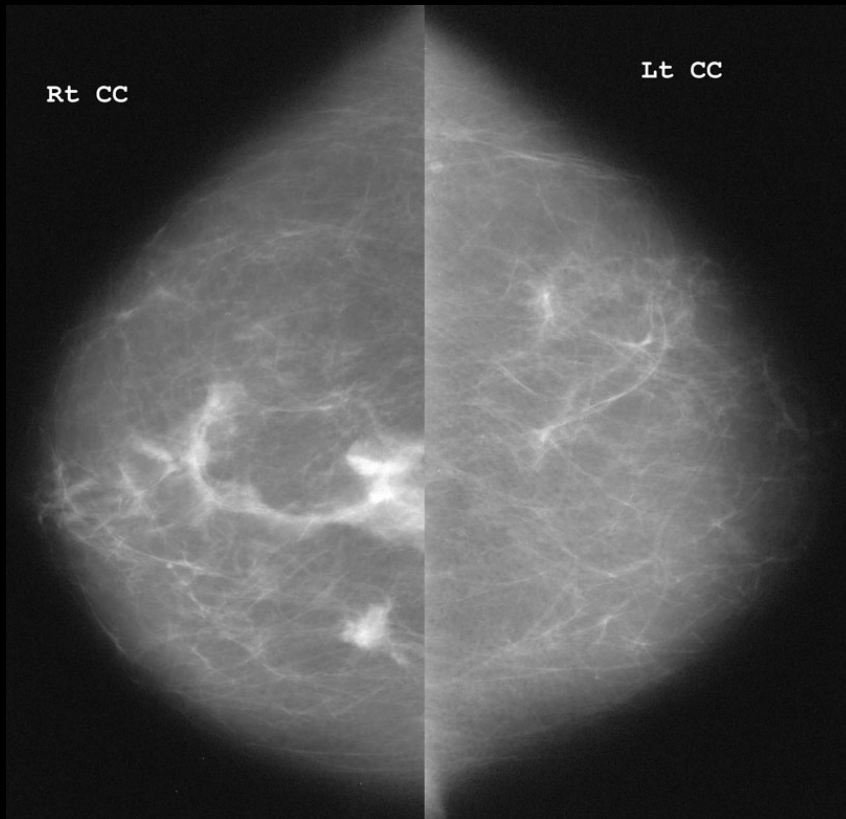
**B** lobular cancer cells  
breaking through the  
basement membrane

**C** basement membrane

# Inside the Mammogram: Pathology & Staging

Mammogram

Invasive Lobular Carcinoma

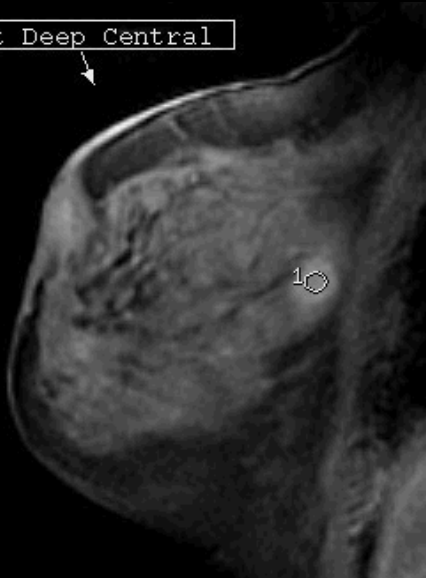


# Inside the Mammogram: Pathology & Staging

## Invasive Lobular Carcinoma

### MRI

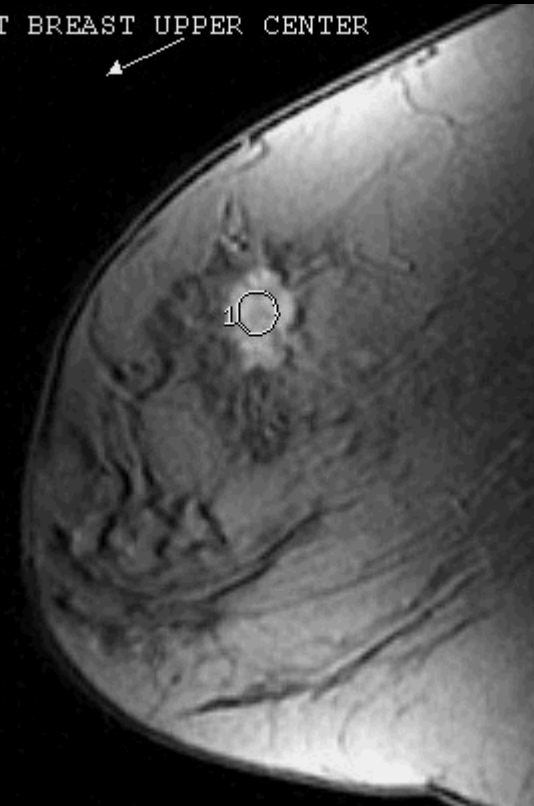
Right Deep Central



Right 10-11 o'clock  
Bx Inferior Lobular CA



RT BREAST UPPER CENTER



# Inside the Mammogram: Pathology& Staging

## Invasive Lobular Carcinoma

Pathology

Under the Microscope



# Inside the Mammogram: Pathology& Staging

## TNM System

**Staging:** A way of describing a cancer, such as where it is located, where it has spread, and if it is affecting the functions of other organs.

TUMOR

NODES

METASTASIS



# Inside the Mammogram: Pathology& Staging

## TUMOR

“T” + LETTER OR NUMBER  
( 0 TO 4) DESCRIBES THE SIZE  
AND LOCATION OF THE TUMOR



# Inside the Mammogram: Pathology& Staging

## TUMOR

TX: The primary tumor cannot be evaluated

T0: There is not evidence of cancer in the breast

Tis: Carcinoma *in situ*  
(DCIS) (LCIS) (Paget's)





# Inside the Mammogram: Pathology & Staging

## TUMOR #

**T1:** A tumor in the breast is 2 cm or smaller in size at its widest dimension

**T1mic:** Micro-invasion, or micro-metastases, means a few cancer cells have spread to surrounding tissue, but none larger than 0.1 cm

**T1a:** The tumor is larger than 0.1 cm but smaller than 0.5 cm

**T1b:** The tumor is larger than 0.5 cm but smaller than 1 cm

**T1c:** The tumor is larger than 1 cm but not larger than 2cm



# Inside the Mammogram: Pathology & Staging

## TUMOR #

T2: The tumor is larger than 2 cm but not larger than 5 cm

T3: The tumor is larger than 5 cm



# Inside the Mammogram: Pathology & Staging

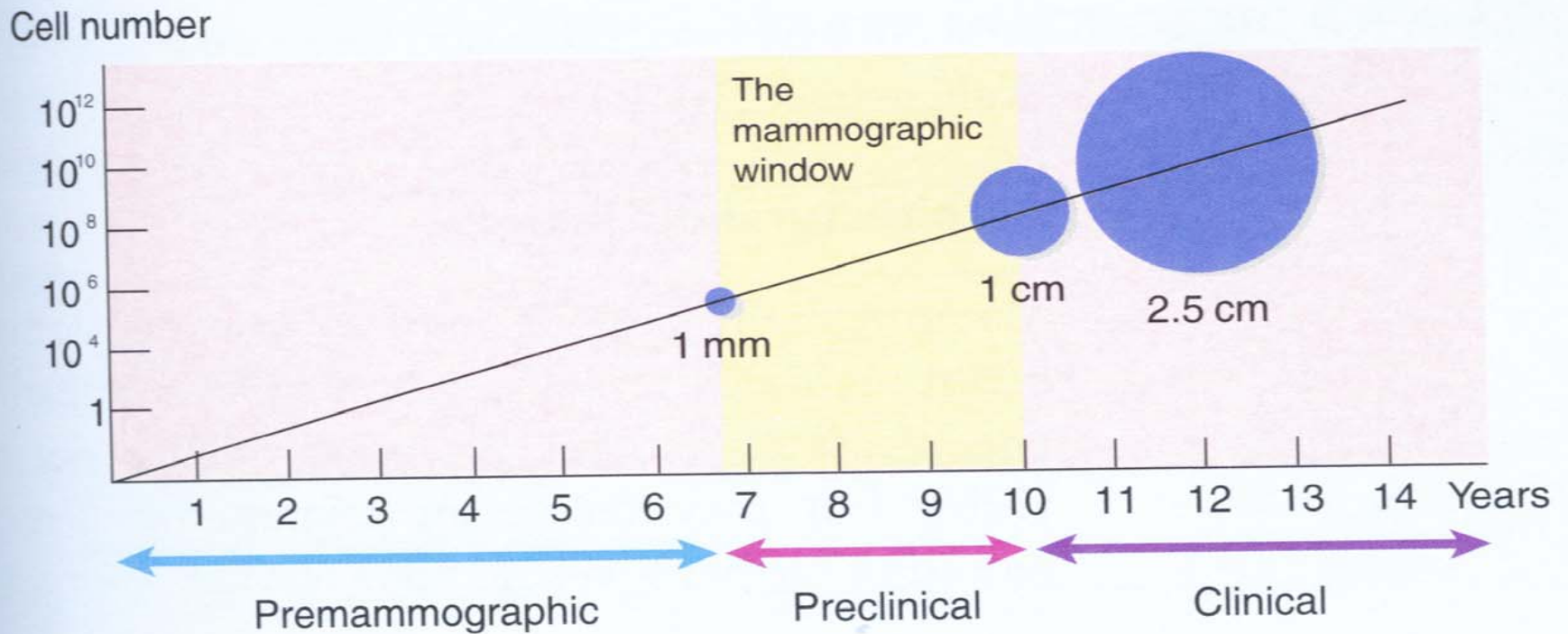
## TUMOR #

- T4:** The tumor has spread to the chest wall or to the skin or is diagnosed as inflammatory breast cancer
- T4a:** The tumor has spread to the chest wall
- T4b:** There is edema (swelling), thickening of the skin (as in peau d'orange), or ulceration (a sore, painful area where the breast skin/tissue is breaking down) of the breast skin or surrounding skin nodules of the same breast
- T4c:** There signs of both T4a and T4b
- T4:d** Refers to inflammatory carcinoma. This is an aggressive type of breast cancer where the breast is red, swollen and warm.



# Inside the Mammogram: Pathology & Staging

## TUMOR



# Inside the Mammogram: Pathology & Staging

## TUMOR



# Inside the Mammogram: Pathology & Staging

## TUMOR

# Inside the Mammogram: Pathology & Staging

## NODES

“N” IS FOR ‘LYMPH NODES’

**A** pectoralis major muscle

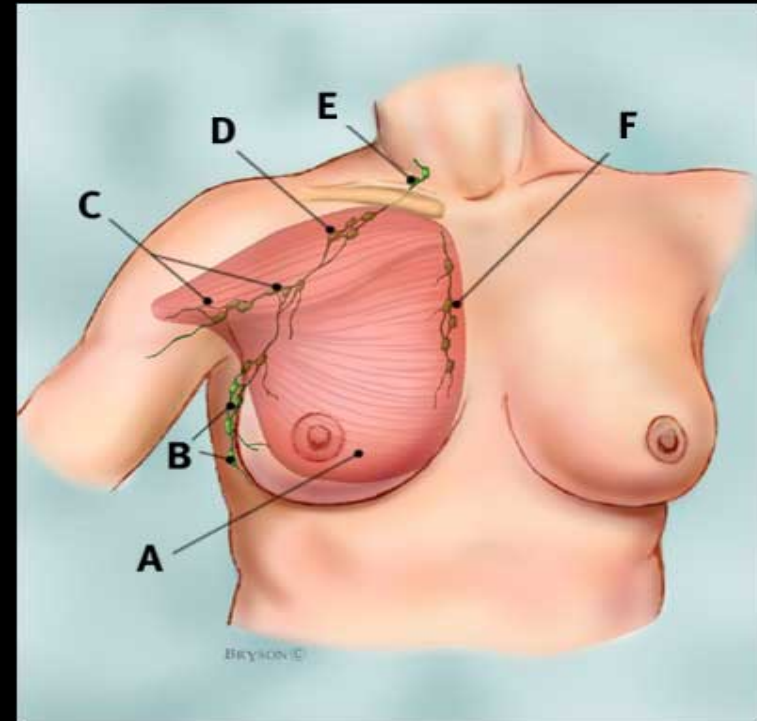
**B** axillary lymph nodes: levels I

**C** axillary lymph nodes: levels II

**D** axillary lymph nodes: levels III

**E** supraclavicular lymph nodes

**F** internal mammary lymph nodes



# Inside the Mammogram: Pathology& Staging

## NODES

**NX:** The lymph nodes cannot be assessed

**N0:** No Cancer was found in the lymph nodes

**N1:** The cancer has spread to 1 to 3 axillary lymph nodes





# Inside the Mammogram: Pathology& Staging

## NODES

- N2:** The cancer has spread to 4 to 9 lymph nodes under the arm or to the internal mammary lymph nodes (lymph nodes to the right or left of the sternum [breast bone] on the inside of the chest) without axillary node involvement
- N2a:** The cancer has spread to 4 to 9 lymph nodes under the arm (at least one tumor deposit is larger than 2 mm)
- N2b:** The Cancer has spread only to the internal mammary lymph nodes



# Inside the Mammogram: Pathology& Staging

## NODES

- N3:** The Cancer has spread to 10 or more lymph nodes under the arm or to the infra-clavicular lymph nodes (located under the collarbone) or to the internal mammary nodes with axillary node involvement
- N3a:** The cancer has spread to 10 or more lymph nodes under the arm or to the infra-clavicular lymph nodes
- N3b:** The cancer has spread to internal mammary nodes and axillary nodes
- N3c:** The cancer has spread to the supra-clavicular lymph nodes



# Inside the Mammogram: Pathology& Staging

## METASTASIS

“M”

INDICATES IF CANCER  
HAS SPREAD TO OTHER  
PARTS OF THE BODY



# Inside the Mammogram: Pathology& Staging

## METASTASIS

**MX:** Distant spread cannot be assessed

**M0:** The disease has not metastasized

**M1:** There is metastasis to another part of the body



# Inside the Mammogram: Pathology& Staging

**Staging:** A way of describing a cancer, such as where it is located, where it has spread, and if it is affecting the functions of other organs.

- 🎗 Stage 0
- 🎗 Stage I
- 🎗 Stage II - A
- 🎗 Stage II - B
- 🎗 Stage III - A
- 🎗 Stage III - B
- 🎗 Stage III - C
- 🎗 Stage IV

# Inside the Mammogram: Pathology& Staging

## Stage 0

### TUMOR

 Non-invasive; DCIS or LCIS (TX, T0, Tis)

### NODES

 No spread to nodes (NX, N0)

### METS

 None (M0)

T0, N0, M0

# Inside the Mammogram: Pathology & Staging

## Stage I

### TUMOR

🎀 Up to 2 cm (T1)

### NODES

🎀 No spread to nodes (N0)

### METS

🎀 None (M)

T1, N0, M0



# Inside the Mammogram: Pathology & Staging

## Stage II A

### TUMOR

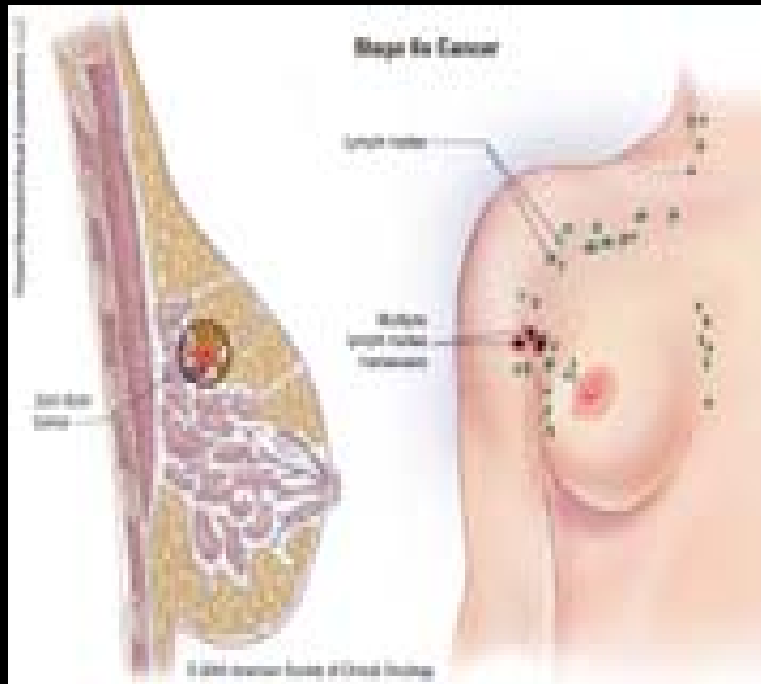
- 🦋 No tumor found in breast or is less than 2 cm (T0, T1)

### NODES

- 🦋 1 - 3 Axillary nodes involved; may have microscopic disease in internal mammary nodes (N1)

### METS

- 🦋 None (M)



### TUMOR

- 🦋 Larger than 2 cm., but less than 5 cm (T2)

### NODES

- 🦋 No Spread to nodes (N0)

### METS

- 🦋 None (M0)

T2, N0, M0

T1, N1, M0



# Inside the Mammogram: Pathology & Staging

## Stage II B

### TUMOR

- 🎗 Larger than 2 cm., but less than 5 cm (T2)

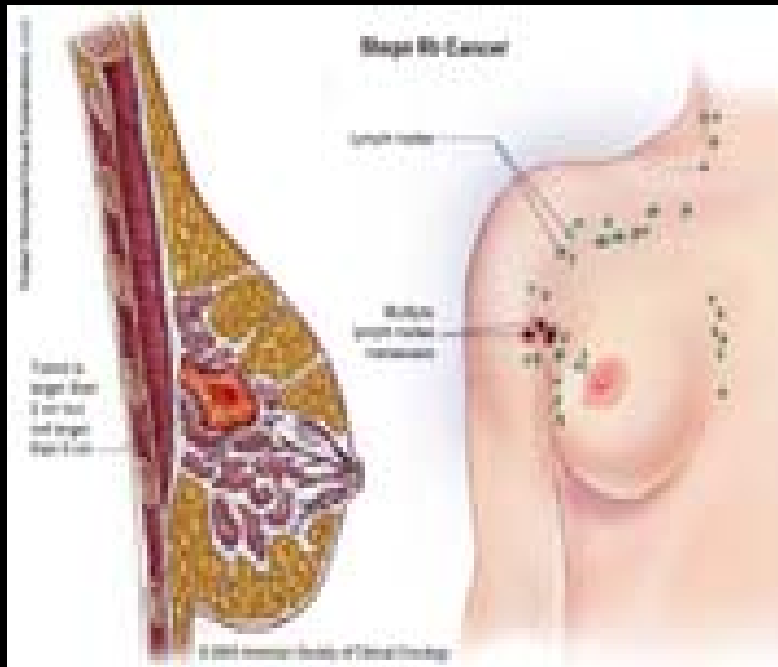
### NODES

- 🎗 1 - 3 axillary nodes involved (N1)

### METS

- 🎗 None (M0)

T2, N1, M0



### TUMOR

- 🎗 Tumor more than 5 cm. (T3)

### NODES

- 🎗 No Spread to nodes (N0)

### METS

- 🎗 None (M0)

T3, N0, M0

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## Stage III A

### TUMOR

- Smaller than 5 cm (T2)

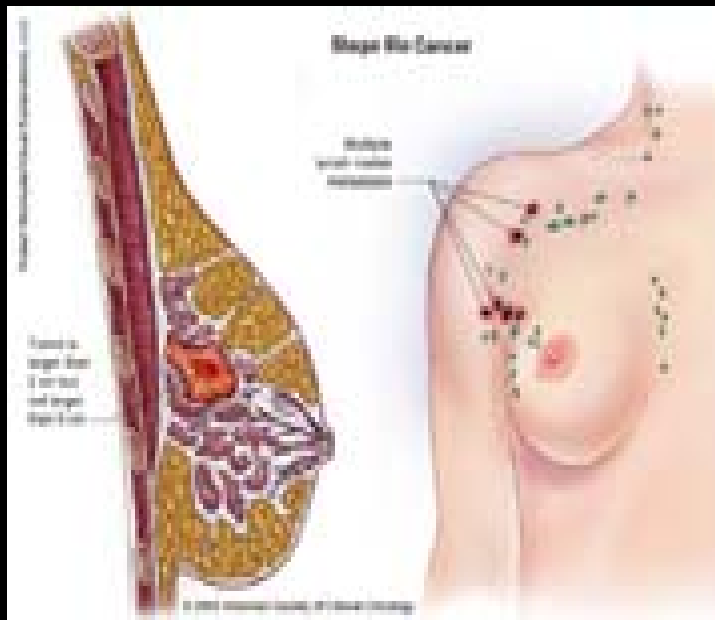
### NODES

- 4 – 9 axillary nodes involved  
or spread next to breastbone (N2)

### METS

- None (M0)

T2, N2, M0



### TUMOR

- Larger than 5 cm (T3)

### NODES

- Spread to 1 – 9 axillary nodes  
+ / - spread to nodes next to  
breastbone (N2)

### METS

- None (M0)

T3, N2, M0

# Inside the Mammogram: Pathology & Staging

## Stage III B

### TUMOR

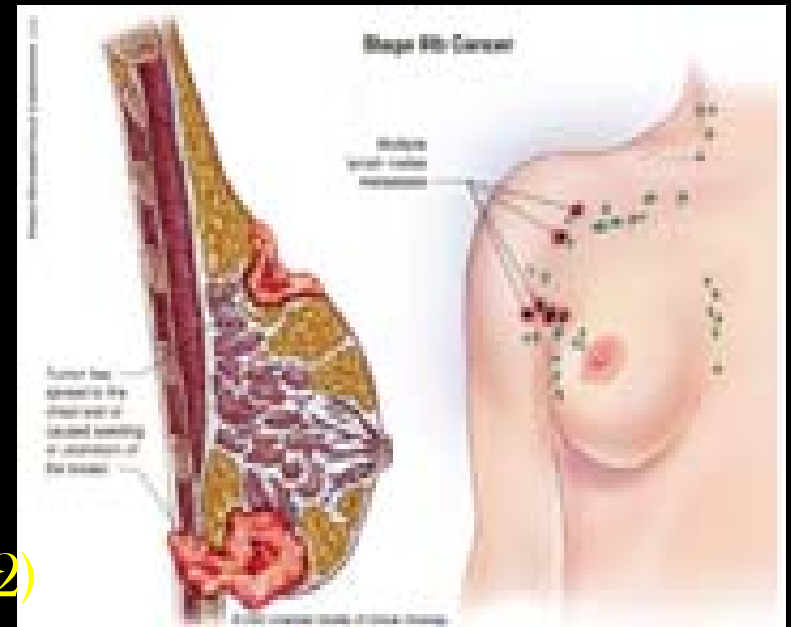
- Any Size, but with spread to skin and/or chest wall (T4)

### NODES

- 0 – 9 axillary nodes involved; may or may not have spread to nodes next to breastbone (N2)

### METS

- None (M0)



T4, N2, M0

# Inside the Mammogram: Pathology & Staging

## Stage III C

### TUMOR

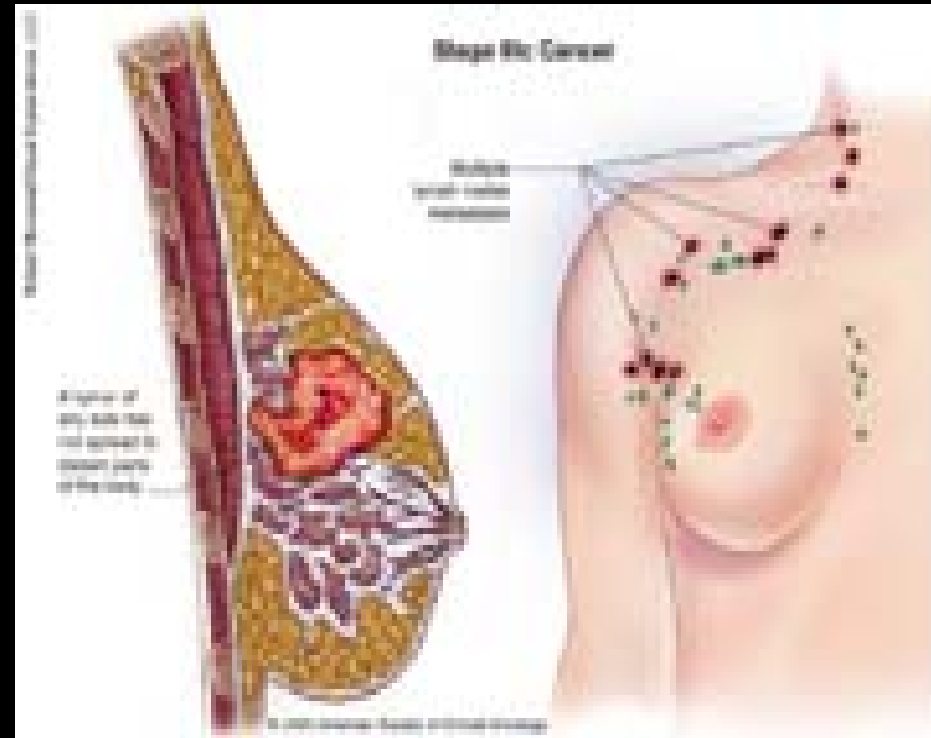
Any Size (T1, T2, T3)

### NODES

Spread to 10+ axillary nodes or to nodes above/below clavicle or to nodes next to breastbone (N3)

### METS

None (M0)



T3, N3, M0

# Inside the Mammogram: Pathology & Staging

## Stage IV

### TUMOR

Any Size (T1,T2,T3)

## METASTATIC BREAST CANCER

### NODES

May or may not have spread to nodes (N0,N1,N2,N3)

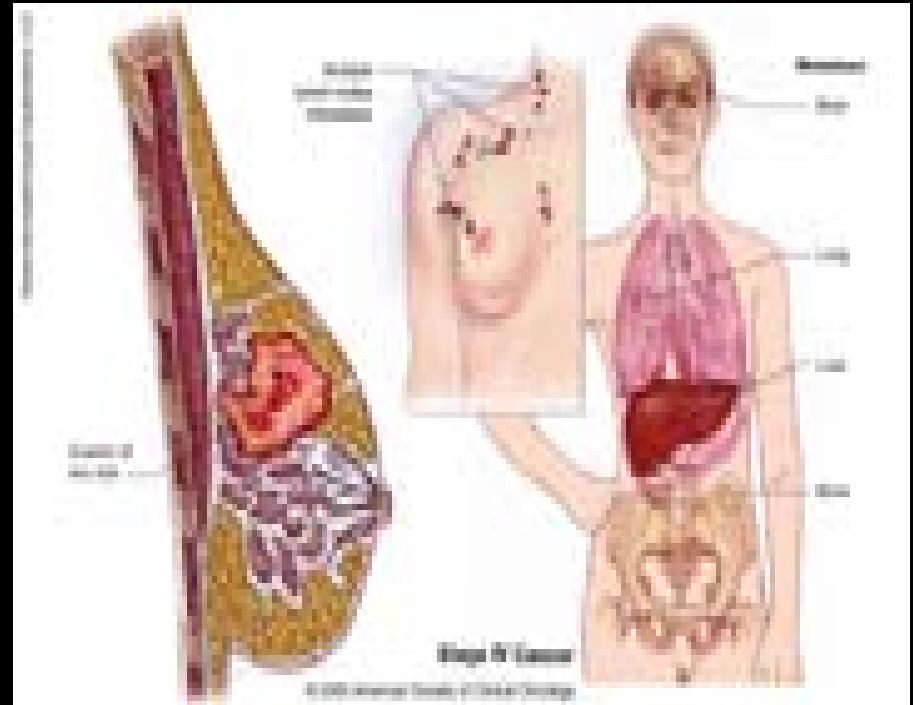
### METS

Spread to distant organs (M1)

T1, N2, M1

T2, N1, M1

T3, N3, M1



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage 0

Non-invasive cancers:

DCIS

LCIS

### Treatment:

Most patients with a small DCIS can have a lumpectomy and radiation therapy.



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage 0

Non-invasive cancers:

DCIS

LCIS

### Prognosis:

Excellent. The 15 yr disease specific survival is 98% for DCIS. LCIS is not a cancer, but is a risk factor for breast cancer.



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage I

Limited Cancer: The cancer is 2 cm or less and has not spread to nodes or distant organs

### Treatment:

Lumpectomy and radiation therapy vs. mastectomy.





# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage I

**Limited Cancer:** The cancer is 2 cm or less and has not spread to nodes or distant organs

### Prognosis:

**Very Good. Almost all are alive 5 years after diagnosis. Most will live much longer.**



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage II

Cancer up to 5 cm, and may have early spread to nodes.

### Treatment:

Lumpectomy + radiation therapy vs. mastectomy. Chemo therapy is recommended.



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage II

Cancer up to 5 cm, and may have early spread to nodes.

### Prognosis:

Good. Depending on tumor size, number of nodes involved and other features, 81% to 92% live at least 5 years after diagnosis



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage III

Locally advanced cancer. Tumor is 5 cm or smaller, but involves 4 – 9 axillary nodes; or tumor has invaded chest wall or skin

### Treatment:

Usually mastectomy + chemotherapy. May choose lumpectomy + radiation + chemotherapy



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage III

Locally advanced cancer. Tumor is 5 cm or smaller, but involves 4 – 9 axillary nodes; or tumor has invaded chest wall or skin

### Prognosis:

Fair. Depending on the number of nodes involved and tumor characteristics 54% to 67% live at least 5 years after diagnosis



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage IV

Metastatic (Distant Spread)

### Treatment:

Focus on quality of life and prolonging life by months to years endocrine and or chemotherapy



# Inside the Mammogram: Pathology & Staging

## SURVIVAL RATES

### Stage IV

Metastatic (Distant Spread)

#### Prognosis:

Not Good. Average survival is 1.5 to 2 years; variable. About 20% of patient will survive at least 5 years.



# Inside the Mammogram: Pathology & Staging



**QUESTIONS ? ? ?**

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